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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/565,585
Filing Date: January 20, 2006
Appellant(s): OKOROAFOR, EMMANUEL UZOMA

____
Ting-Mao Chao
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed April 29, 2011 appealing from the Office action mailed April 14, 2010.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims 1-43 are pending.

Claims 1-4, 6-8, 10-14, 24 and 26 are rejected.

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

2004/0247904	CHAN	12-2004
5,811,194	KURZE ET AL.	09-1998
6,029,571	JOHNER ET AL.	02-2000
JP 54-31479	KOKEN KOGYO KK	3-1979
WO 02/25113	HASERT ET AL.	3-2002
6,655,937	HASERT ET AL.	12-2003
4,647,347	SCHOENER ET AL.	3-1987

Wu et al., "Effect of Polishing Pretreatment on the Fabrication of Ordered Nanopore Arrays on Aluminum Foil by Anodization", J. Vac. Sci. Technol., Vol. B 20(3), May/June 2002, pp. 776-782.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 112

Claims **1-4, 6-8, 10-14, 24 and 26** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1

lines 3-4, recite "is selected from the group of metals including". The alternative expression of the Markush group is improper. One acceptable form of alternative expression, which is commonly referred to as a Markush group, recites members as being "selected from the group consisting of A, B and C." See *Ex parte Markush*, 1925 C.D. 126 (Comm'r Pat. 1925). It is improper to use the term "comprising" instead of "consisting of." Ex parte Dotter, 12 USPQ 382 (Bd. App. 1931) [MPEP § 2173.05(h)].

The transitional term "comprising", which is synonymous with "*including*", "containing", or "characterized by", is inclusive or open-ended and does not excludes additional, unrecited elements or methods steps (MPEP § 2111.03).

Claim 13

lines 1-2, “the coating comprising the metallic layer and the sintered ceramic oxide layer” lacks antecedent basis.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

I. Claims **1-3, 6, 8 and 12-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chan** (US Patent Application Publication No. 2004/0247904 A1) in view of **Kurze et al.** (US Patent No. 5,811,194).

Chan teaches a method of forming a coating on a plastics substrate comprising the steps of:

• applying a metallic layer to the plastic substrate (= by way of simple PVD method, an aluminum alloy may first be deposited onto the surface of the substrate) wherein the metallic layer is selected from the group of metals including at least magnesium, titanium, tantalum, zirconium, niobium, hafnium, tin, tungsten, molybdenum, vanadium, antimony, bismuth, and alloys of the aforementioned metals (= an aluminum alloy including aluminum and at least one other metal, e.g. such refractory metals as titanium (Ti), zirconium (Zr), hafnium (Hf), vanadium (V), niobium (Nb) and

tantalum (Ta)) [page 2, [0020]]; and

• subjecting the metallic layer to electrolytic oxidation, wherein the metallic layer is anodically charged (= this layer of aluminum alloy is converted into oxides of aluminum, including e.g. Al_2O_3, and oxides of the other metal, e.g. TiO_2, by anodic oxidation) [page 2, [0020]] and immersed in an aqueous electrolytic solution (= the electrolytic solution of anodic oxidation includes phosphoric acid, sulphuric acid and oxalate salts) [page 3, [0033]] for forming at least a ceramic oxide layer on the metallic layer (= this layer of aluminum alloy is then converted into oxides of aluminum, including e.g. Al_2O_3, and oxides of the other metal, e.g. TiO_2) [page 2, [0020]].

The group of metals further includes aluminium (= an aluminum alloy) [page 2, [0020]].

The metallic layer is deposited on the substrate (= by way of simple PVD method) [page 2, [0020]].

The metallic layer comprises a thickness less than 100μm (= the aluminum alloy layer is of a thickness of 0.5 to 20 microns) [page 2, [0020]].

The metallic layer is formed on a second metallic layer (= an interfacial layer comprising at least principally of chromium) [page 4, claim 13] previously applied to the substrate (= wherein step (c) is carried out before said step (a) and step (b)) [page 4, claim 12].

The coating comprising the metallic layer and the ceramic oxide layer has a thickness less than 100μm (= said matrix is of a thickness of substantially 0.5 to

20 microns) [page 4, claim 19].

The thickness is less than 50μm (= said matrix is of a thickness of substantially 0.5 to 20 microns) [page 4, claim 19].

The method of Chan differs from the instant invention because Chan does not disclose the following:

a. Wherein the electrolytic oxidation is <u>*an electrolytic plasma oxidation*</u>, as recited in claim ***1***.

b. Wherein the ceramic oxide layer is a sintered ceramic oxide layer, as recited in claim ***1***.

c. Wherein <u>*the electrolytic plasma oxidation*</u> is performed at a pH from 7 to 8.5, as recited in claim ***12***.

Chan teaches that:

In a solid substrate surface-treated in accordance with a method according to the present invention, a matrix of hard aluminum oxide and soft oxide of, e.g. a refractory metal will form, creating a buffering effect, and rendering the coating very resilient. Experiments indicate that after an aluminum substrate coated with a 3-micron aluminum oxide/titanium oxide coating has been subjected to <u>*bending*</u> of 90° or even 180° for over 50 times, no crack or crevice was evident upon observation via a 100x microscope. The present invention can thus be applied on substrates of all shape forms (pages 2-3, [0028]).

Like Chan, ***Kurze*** teaches the anodic oxidation of aluminum alloys (col. 2, lines 15-32). Kurze teaches a plasma-chemical anodic oxidation (col. 1, lines 13-18). The electrolytic plasma oxidation is performed at a pH from 7 to 8.5 (= a pH value of 2 to 8) [col. 2, lines 25-26]. Kurze teaches that oxide ceramic layers which have a substantially

greater thickness of up to 150 μm, are resistant to abrasion and corrosion and have *a high alternating bending strength* (col. 2, lines 10-14).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electrolytic oxidation described by Chan with (a) to (c) above because a plasma-chemical anodic oxidation would have produced an oxide ceramic layer not only having high alternating bending strength but also having resistance to abrasion and corrosion as taught by Kurze (col. 2, lines 10-32).

II. Claims **4 and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chan** (US Patent Application Publication No. 2004/0247904 A1) in view of **Kurze et al.** (US Patent No. 5,811,194) as applied to claims 1-3, 6, 8 and 12-14 above, and further in view of **Johner et al.** (US Patent No. 6,029,571).

Chan and Kurze are as applied above and incorporated herein.

The method of Chan differs from the instant invention because Chan does not disclose the following:

a. Wherein *the metallic layer is sprayed* on the substrate, as recited in claim ***4***.

b. Wherein the substrate comprises an epoxy-carbon fibre composite or fibre reinforced plastics material, as recited in claim ***10***.

Chan teaches:

By way of simple *PVD method*, an aluminum alloy, i.e. an aluminum alloy including *aluminum* and at least one other metal, e.g. such refractory metals as *titanium*

(Ti), zirconium (Zr), hafnium (Hf), vanadium (V), niobium (Nb) and tantalum (Ta), may first be deposited onto the surface of the substrate (page 2, [0020]).

Like Chan, ***Johner*** teaches depositing a layer of an aluminum alloy on the surface of a plastic substrate having a shaped form. Johner teaches applying a layer of Al-Ti alloy on a hollow cylindrical body made of a plastic material, which may be fiber-reinforced (col. 3, lines 37-39). The layer is applied by *thermal spraying, physical vapor deposition (PVD)*, chemical vapor deposition (CVD), plasma chemical vapor deposition or galvanizing (col. 4, lines 50-58).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the metallic layer and substrate described Chan with wherein the metallic layer is sprayed on the substrate; and wherein the substrate comprises an epoxy-carbon fibre composite or fibre reinforced plastics material because thermal spraying a layer of Al-Ti alloy on a body made of a fibre reinforced plastics material would have been functionally equivalent to physical vapor depositing (PVD) a layer of Al-Ti alloy on a body made of a plastic material as taught by Johner (col. 4, lines 50-58).

Furthermore, a plastic material which is fiber-reinforced would have meant a plastic material that was strengthened with fibers.

III. Claim **7** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Chan** (US Patent Application Publication No. 2004/0247904 A1) in view of **Kurze et al.** (US Patent No. 5,811,194) as applied to claims 1-3, 6, 8 and 12-14 above, and further in view of **JP**

54-31479 ('479).

Chan and Kurze are as applied above and incorporated herein.

The method of Chan differs from the instant invention because Chan does not disclose wherein *the substrate is roughened* prior to applying the metallic layer thereto, as recited in claim ***7***.

Chan teaches plastics substrates (page 2, [0020]).

JP '479 teaches physically roughening the surface of the plastic structure and spraying molten metal (e.g., Al, Zn, etc.) on the roughened surface of the structure to form a metal coating film (abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the substrate described by Chan with wherein the substrate is roughened prior to applying the metallic layer thereto because roughening the plastic structure would have created anchoring holes to anchor a metal coating film to the plastic structure as taught by JP '479 (abstract).

IV. Claim **11** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Chan** (US Patent Application Publication No. 2004/0247904 A1) in view of **Kurze et al.** (US Patent No. 5,811,194) as applied to claims 1-3, 6, 8 and 12-14 above, and further in view of **Wu et al.** ("Effect of Polishing Pretreatment on the Fabrication of Ordered Nanopore Arrays on Aluminum Foil by Anodization", *J. Vac. Sci. Technol.*, Vol. B 20(3), May/June 2002, pp. 776-782).

Chan and Kurze are as applied above and incorporated herein.

The method of Chan differs from the instant invention because Chan does not disclose wherein the method further includes the step of *smoothening the metallic layer* prior to the step of subjecting the metallic layer to electrolytic plasma oxidation, as recited in claim ***11.***

Wu teaches that in order to get porous anodic aluminum oxide with perfect hexagonal-packed cells, electropolishing of Al foils has been conducted to obtain a smoother surface before anodization (page 776, "I. Introduction").

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method described by Chan with wherein the method further includes the step of smoothening the metallic layer prior to the step of subjecting the metallic layer to electrolytic plasma oxidation because electropolishing the aluminum would have obtained a smoother surface for producing a porous anodic aluminum oxide with perfect hexagonal-packed cells as taught by Wu (page 776, "I. Introduction").

V. Claim **24** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Chan** (US Patent Application Publication No. 2004/0247904 A1) in view of **Kurze et al.** (US Patent No. 5,811,194) as applied to claims 1-3, 6, 8 and 12-14 above, and further in view of **WO 02/25113** and **Hasert et al.** (US Patent No. 6,655,937 B2).

Hasert is the English equivalent of WO 02/25113.

Chan and Kurze are as applied above and incorporated herein.

The method of Chan differs from the instant invention because Chan does not disclose wherein the substrate is a component of *a vacuum pump*, as recited in claim ***24***.

Chan teaches that the present invention can thus be applied on substrates of all shaped forms (col. 5, lines 24-25).

Hasert teaches that:

> The vane **15** has formed-on terminal parts **22** and **23**, *which comprise a high-temperature-resistant thermoplastic such as polyaryletherketone (PEEK), or a material of comparable properties*. This plastic, optionally modified with a specially assembled combination of fillers, has a wear resistance and a low coefficient of friction (col. 2, lines 38-43).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the substrate described by Chan with wherein the substrate is a component of a vacuum pump because terminal parts on a vane for a vane cell vacuum pump would have been comprised of a high-temperature-resistant thermoplastic which are modified with fillers, and have a wear resistance and a low coefficient of friction as taught by Hasert (col. 2, lines 38-43).

VI. Claim **26** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Chan** (US Patent Application Publication No. 2004/0247904 A1) in view of **Kurze et al.** (US Patent No. 5,811,194) as applied to claims 1-3, 6, 8 and 12-14 above, and further in view of **Schoener et al.** (US Patent No. 4,647,347).

Chan and Kurze are as applied above and incorporated herein.

The method of Chan differs from the instant invention because Chan does not disclose wherein the method further comprises the step of applying to the metallic layer subjected to electrolytic plasma oxidation a layer formed from at least one metal selected from the group consisting of *Mo, Ni, Cr and W*, as recited in claim ***26***.

Schoener teaches sealing anodized aluminum and alloys thereof in a sealant bath comprised of nickel ion (col. 3, lines 1-46).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method described by Chan with wherein the method further comprises the step of applying to the metallic layer subjected to electrolytic plasma oxidation a layer formed from at least one metal selected from the group consisting of Mo, Ni, Cr and W because nickel would have sealed anodized aluminum and alloys thereof as taught by Schoener (col. 3, lines 1-46).

(10) Response to Argument

A. Examiner errs in rejecting claims 1-3, 6, 8 and 12-14 under 35 USC 103(a) as being unpatentable over Chan in view of Kurze.

• Appellant states that Chan teaches a much lower range of voltages for its electrolytic oxidation method. In Chan, the voltage range varies between 0 and 110 volts, *which is much lower than the voltage required for an electrolytic plasma oxidation process*.

In response, Chan teaches that the DC power supply had an input voltage of 220 volts, and *an adjustable output of between 0-110 volts* (page 3, [0032]; and Table 1).

Kurze teaches that the voltage end value may *reach up to 2000 V* (col. 3, lines 10-11). Kurze's Examples disclose 250 volts (Examples 1 and 6), 216 volts (Example 2), 252 volts (Example 3), 210 volt (Example 4) and 800 volts (Example 5).

The voltage required for the electrolytic plasma oxidation process disclosed by Kurze encompasses the voltage required for the electrolytic oxidation process disclosed by Chan.

• Appellant states that electrolytic plasma oxidation would require a voltage outside the range disclosed by Chan. If the electrolytic plasma oxidation were used in Chan's process, *none of the colors listed in Chan's table 1 would have been produced, because of the high voltages required by the electrolytic plasma oxidation process*. Thus, using the electrolytic plasma oxidation in Chan's process would defeat its intended purpose, which is to obtain different colors by applying low voltages to the Al/Ti alloy.

In response, Chan teaches *anodic oxidation* (page 2, [0033]) and Kurze teaches *plasma-chemical* anodic oxidation (col. 2, lines 18-32).

The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references.

Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Chan teaches that the DC power supply had an input voltage of 220 volts, and an adjustable output of between 0-110 volts (page 3, [0032]; and Table 1). *It is believed that more colours could be developed if the output voltage could be further upwardly adjusted* (page 3, [0034]). Disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments (MPEP § 2123 (II)).

Kurze teaches that the voltage end value may *reach up to 2000 V* (col. 3, lines 10-11). Kurze's Examples disclose 250 volts (Examples 1 and 6), 216 volts (Example 2), 252 volts (Example 3), 210 volt (Example 4) and 800 volts (Example 5).

The output voltage disclosed by Chan would have been further upwardly adjusted to higher than 110 volts where more colors would have been developed. There is no reason or evidence that a voltage of, for example, 210 volts would not have accomplished what Chan had proposed.

B. Claim 4 and 10 are patentable over Chan in view of Kurze and Johner under 35 USC 103(a) by virtue of their dependency from claim 1.

Since parent claim 1 is deemed unpatentable, the rejection of claims 4 and 10

under 35 U.S.C. 103(a) as being unpatentable over Chan in view of Kurze et al. as applied to claims 1-3, 6, 8 and 12-14 above, and further in view of Johner et al. has been maintained.

C. Claim 7 is patentable over Chan in view of Kurze and the '479 patent under 35 USC 103(a) by virtue of its dependency from claim 1.

Since parent claim 1 is deemed unpatentable, the rejection of claim 7 under 35 U.S.C. 103(a) as being unpatentable over Chan in view of Kurze et al. as applied to claims 1-3, 6, 8 and 12-14 above, and further in view of JP 54-31479 ('479) has been maintained.

D. Claim 11 is patentable over Chan in view of Kurze and Wu under 35 USC 103(a) by virtue of its dependency from claim 1.

Since parent claim 1 is deemed unpatentable, the rejection of claim 11 under 35 U.S.C. 103(a) as being unpatentable over Chan in view of Kurze et al. as applied to claims 1-3, 6, 8 and 12-14 above, and further in view of Wu et al. has been maintained.

E. Claim 24 is patentable over Chan in view of Kurze, the '194 patent, and the '937 patent under 35 USC 103(a) by virtue of its dependency from claim 1.

Since parent claim 1 is deemed unpatentable, the rejection of claim 24 under 35 U.S.C. 103(a) as being unpatentable over Chan in view of Kurze et al. as applied to

claims 1-3, 6, 8 and 12-14 above, and further in view of WO 02/25113 and Hasert et al. has been maintained.

F. Claim 26 is patentable over Chan in view of Kurze and Schoener under 35 USC 103(a) by virtue of its dependency from claim 1.

Since parent claim 1 is deemed unpatentable, the rejection of claim 26 under 35 U.S.C. 103(a) as being unpatentable over Chan in view of Kurze et al. as applied to claims 1-3, 6, 8 and 12-14 above, and further in view of Schoener et al. has been maintained.

G. Appellant presents no argument against the rejections against claims 1-4, 6-8, 10-14, 24, and 26 under 35 USC 112, second paragraph, and will amend the claims to overcome the rejections upon a decision by the Board of Patent Appeals on the above-discussed issues.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Edna Wong/

Primary Examiner, Art Unit 1759

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